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NAVFAC **IGS-08800 (MAY 2002)**

Preparing Activity: LANTNAVFACENGCOM **Based on UFGS-08800N**

ITALIAN GUIDE SPECIFICATIONS

Use for ITALIAN projects only

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SECTION 08800

GLAZING

05/02

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NOTE: This guide specification is issued by the Atlantic Division, Naval Facilities Engineering Command for regional use in Italy.

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NOTE: This guide specification covers normal glazing. If special glazing such as leaded glass, laminated transparent mirrors, or plastic glazing for unprotected openings is required, add appropriate paragraphs.

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NOTE: This section contains both metric and inch-pound graphics. Instructions to print graphics may be copied, viewed, or printed through:

(SISGML): Select "FORMS/DOCUMENTS" from JOBS or MASTERS main menu - press "ENTER" or click on "Agency Document Files"

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For Master, highlight "XNAVY," press "ENTER." For Document, highlight "GRAPHIC," press "ENTER" (after retrieving this file, press "ESC" and from "Your

Choice" press "P" to print.

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NOTE: On the drawings, show:

1. Locations of each type of glass, using same terminology as in specification.

2. Thickness of glass, unless glass of each type is same thickness.

3. Frame and rabbet details, indicating method of glazing.

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Comments and suggestion on this specification are welcome and should be directed to the technical proponent of the specification. A listing of the technical proponents, including their organization designation and telephone number, is on the Internet.

Use of electronic communication is encouraged.

Brackets are used in the text to indicate designer choices or locations where text must be supplied by the designer.

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PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

EUROPEAN COMMITTEE FOR STANDARDIZATION (EN)

EN 572-1	(1995) Glass in Building - Basic Soda Lime Silicate Glass Products. Part 1: Definitions and General Physical and Mechanical Properties
EN 572-2	(1995) Glass in Building - Basic Sode Lime Silicate Glass Products. Part 2: Float Glass
EN 572-3	(1995) Glass in Building - Basic Soda Lime Silicate Glass Products. Part 3: Polished Wire Glass
EN 572-5	(1995) Glass in Building - Basic Soda Lime

	Silicate Glass Products. Part 5: Patterned Glass

INTERNATIONAL STANDARDS ORGANIZATION (ISO)

ISO 3934	(1978) Rubber Building Gaskets - Materials in Preformed Solid Vulcanizates Used for Sealing Glazing and Panels
ISO 7391-1	(1996) Plastics - Polycarbonate (PC) Molding and Extrusion Materials - Part 1: Designation System and Basis for Specifications
ISO 7823-1	(1991) Plastics - Poly Methyl Methacrylate Sheets - Types, Dimensions and Characteristics - Part 1: Cast Sheets
ISO 7823-2	(1996) Plastics - Poly Methyl Methacrylate Sheets - Types, Dimensions and Characteristics - Part 2: Melt-Calendered Extruded Sheets
ISO 9352	(1995) Plastics - Determination of Resistance to Wear by Abrasive Wheels
ISO 11600	(1993) Building Construction - Sealants - Classification and Requirements
ISO 11963	(1995) Plastics - Polycarbonate Sheets - Types, Dimensions and Characteristics

ENTE UNIFICAZIONE D'ITALIA (UNI)

UNI 6534	(1974) Glazing In Building Construction - Design, Materials and Installation
UNI 7142	(1988) Flat Glass - Tempered Glass for Buildings and Furnishings
UNI 7172	(1987) Flat Glass - Laminated Glass for Buildings and Furniture
UNI 7697	(1977) Flat Glass - Glass in Building Construction - Safety Criteria
UNI 9186	(1987) Flat Glass - Laminated Glass for Buildings and Furniture with Anti-Vandalism and Anti-Crime Performance
UNI 9187	(1987) Flat Glass - Laminated Glass for Buildings and Furniture with Anti-Projectile Performance

UNI 9723	(1990) Resistance to Fire of Doors and Other Elements of Closure, Tests and Criteria of Classification
UNI 10593/1	(1996) Glass for Building Construction, Insulating Glass - Generalities and Dimensional Tolerances (Proposed EN 1279-1)
UNI 10593/2	(1996) Glass for Building Construction, Insulating Glass - Tests of Aging, Measurement of Penetration of Water Vapor and Requirements (Proposed EN 1279-2)
UNI 10593/3	(1996) Glass for Building Construction, Insulating Glass - Initial Type of Tests for the Measurement of the Speed of the Loss of Gas from Insulated Glass Filled with Gas (Proposed EN 1279-3)
UNI 10593/4	(1996) Glass for Building Construction, Insulating Glass - Method of Tests for Determining the Physical Properties of Sealing the Edges (CEN Technical Committee Document 129/WG4 No. 157:1994)

1.2 SUBMITTALS

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NOTE: Submittals must be limited to those necessary for adequate quality control. The importance of an item in the project should be one of the primary factors in determining if a submittal for the item is required.

A "G" following a submittal item indicates that the submittal requires Government approval. Some submittals are already marked with a "G". Only delete an existing "G" if the submittal item is not complex and can be reviewed through the Contractor's Quality Control system. Only add a "G" if the submittal is sufficiently important or complex in context of the project.

For submittals requiring Government approval on Army projects, a code of up to three characters within the submittal tags may be used following the "G" designation to indicate the approving authority. Recommended codes for Army projects are "RE" for Resident Engineer approval, "ED" for Engineering approval, and "AE" for Architect-Engineer approval. Codes following the "G" typically are not used for Navy projects.

Submittal items not designated with a "G" are

considered as being for information only for Army projects and for Contractor Quality Control approval for Navy projects.

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Submit the following in accordance with section entitled "Submittal Procedures."

SD-08 Manufacturer's Instructions

Setting and sealing materials

Glass setting

Submit glass manufacturer's recommendations for setting and sealing materials and for installation of each type of glazing material specified. [Include cleaning instructions for plastic sheets.]

1.3 DELIVERY, STORAGE, AND HANDLING

Deliver products to the site in unopened containers, labeled plainly with manufacturers' names and brands. Store glass and setting materials in safe, dry locations and do not unpack until needed for installation. Handle and install materials in a manner that will protect them from damage.

1.4 ENVIRONMENTAL REQUIREMENTS

Do not start glazing work until the outdoor temperature is above 4 degrees C 40 degrees F and rising, unless procedures recommended by the glass manufacturer and approved by the Contracting Officer are made to warm the glass and rabbet surfaces. Provide ventilation to prevent condensation of moisture on glazing work during installation. Do not perform glazing work during damp or rainy weather.

1.5 WARRANTY

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NOTE: The warranty clauses in this guide specification have been approved by a Level I Contracting Officer, and may be used without further approval or request for waiver.

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NOTE: Delete inapplicable paragraph[s].

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1.5.1 Warranty for Insulating Glass Units

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NOTE: For Air Force installations, select 10 years for the guarantee period for control tower units.

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Warranty insulating glass units against development of material obstruction to vision (such as dust or film formation on the inner glass surfaces) caused by failure of the hermetic seal, other than through glass breakage, for a 5-year period following acceptance of the work. Provide new units for any units failing to comply with terms of this warranty within 45 working days after receipt of notice from the Government. [For control tower units, the warranty period shall be [5] [10] years.]

1.5.2 Warranty for Polycarbonate Sheet

For a 5-year period following acceptance of the work:

a. Warranty, Class A (UV stabilized) sheets against breakage;

b. Warranty (coated, mar-resistant) sheets against breakage and against coating delamination;

c. Warranty (coated sheet) against breakage and against yellowing;

d. Warranty extruded polycarbonate profile sheet against breakage.

For a 10-year period following acceptance of the work, warranty against yellowing and loss of light transmission.

PART 2 PRODUCTS

2.1 GLASS

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NOTE: Glazed openings subject to accidental human impact shall be glazed with safety glazing material in accordance with UNI 7697 Glazing in Building Construction - Safety Criteria. Consult applicable building codes for detail requirements.

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In doors and sidelights, provide safety glazing material conforming to UNI 7697.

2.1.1 Clear Glass

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NOTE: Glass areas and thicknesses are based on 1.20 kilopascals 25 pounds per square foot (psf) design wind load and vertical glazing with annealed glass. For other glass and for wind loads greater than 1.20 kPa25 psf, thickness will depend upon aspect ratio (length divided by width), area, and design wind load. The thickness and area limitations for each type of glass must be indicated or specified. Do not specify glass less than 3.0 mm1/8 inch.

Method of Determination for Minimum Glass Thickness:

1. Determine peak gust wind speed and corresponding design wind loads, considering location, height, shape, and orientation, in accordance with MIL-HDBK-1002/2, "Structural Engineering - Loads".

2. Determine aspect ratio, area, and type of glass for each opening to be glazed.

3. Select thickness required from glass manufacturer's chart for each type of glass.

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NOTE: For interior glazing (i.e., pass and observation windows), 6 mm1/4 inch thick glass should be used.

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Unless otherwise indicated, provide clear float glass meeting the requirements of EN 572-2 with the following minimum requirements. Use double-strength sheet glass or 3 mm 1/8 inchfloat glass for openings up to and including 1.39 square meters15 square feet, 4.5 mm 3/16 inchfor glazing openings over 1.39 square meters 15 square feetbut not over 2.79 square meters30 square feet, and 6 mm1/4 inch for glazing openings over 2.79 square meters 30 square feetbut not over 4.18 square meters45 square feet.

a. Thickness as indicated, but not less than 3 mm.

b. Spot faults category A, 0.5 mm maximum.

c. Optional faults: none when viewed at an angle of 50 degrees.

Provide glass in the following thickness:

Up to 1.4 square meters: 3 mm.

From 1.4 to 2.8 square meters: 4.5 mm.

From 2.8 to 4.2 square meters: 6.0 mm.

2.1.2 Heat Absorbing Glass

Provide heat absorbing float glass cast in a metallic wash in a controlled atmosphere meeting the requirements of EN 572-2, with a coefficient of thermal transmission (for 6 mm)=5.7W/square meter X degrees Kelvin, tinted [bronze] [green] [amber] [gray] [rose]. Thickness [as indicated] [____] mm.

2.1.3 Wire Glass

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NOTE: Wire glass is no longer produced in the United States. On 17 March 1992 (effective for a five year period) OSD determined that the Buy

America Act does not apply to the procurement of wire glass and added the product to the list of excepted materials under FAR 25.108(d)(1). Accordingly, wire glass furnished in compliance with Section 08800, "Glazing," does not violate the Buy America Act.

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Provide clear wire glass meeting the requirements of EN 572-3 with the following minimum requirements:

a. Wire diameter: 0.42 mm minimum.

b. Wire grid size: 12.5 mm [(square pattern)] [____].

c. Thickness: 6 mm or as indicated.

[Provide wire glass for fire-rated openings with a fire resistance rating of [REI 30] [REI 60] [REI 120].]

2.1.4 Patterned Glass

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NOTE: Patterned glass is normally provided for windows of toilet rooms and vertical sliding sash in post offices. Patterned glass 3 mm 1/8 inch thick should not be larger than 2.15 square meters 6 square feet.

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Provide patterned glass meeting the requirements of EN 572-5 and the following minimum requirements:

a. Pattern description: [Linear] [Geometric][____], [one side] [two sides].

b. Thickness: [As indicated] [As specified in the paragraph entitled "Clear Glass".]

[c. Translucent: Glass with a frosted finish to obscure vision through glazing. Locate frosted finish to interior side of wall.]

2.1.5 Laminated Glass

Provide laminated glass meeting the requirements of UNI 7172 fabricated of two pieces of float glass in accordance with the paragraph entitled, "Clear Glass", laminated together with a clear polyvinyl butyral (PVB) interlayer. The total thickness shall be [_____] [as indicated].

2.1.6 Projectile-Resisting Glass

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NOTE: Projectile-resisting glazing material is available in four power ratings to resist scattered

shots from (1) medium-power small arms (MSA); (2) high-power small arms (HSA); (3) super-power small arms (SSA); and (4) high-power rifles (HR). Projectile-resisting glass is available in thicknesses of 30.2, 38.1, 44.5, and 50.8 mm 1 3/16, 1 1/2, 1 3/4, and 2 inches to meet those power ratings.

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Provide projectile-resisting glass in accordance with paragraph entitled, "Laminated Glass" and the requirements of UNI 9187, [Class A, 500 joules energy resistance (9 mm pistol)] [Class B, 1000 joules energy resistance (357 magnum)] [Class C, 1500 joules energy resistance (44 magnum)] [Class D, 2000 joules energy resistance (7.62 x 39)] [Class E, 3300 joules energy resistance (7.62 NATO)].

2.1.8 Tempered Glass

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NOTE: Tempered glass is the preferred material for areas requiring safety glazing materials. Laminated glass, organic-coated glass, wire glass, and plastic sheet are permitted if they conform to the requirements of the CPSC 16 CFR Part 1201.

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Provide fully tempered glass meeting the requirements of UNI 7142 in thickness indicated but not less then [____] mm thick [and wherever safety glazing material is indicated or specified].

2.2 INSULATING GLASS UNITS

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NOTE: Where safety glazing is required, both lights of insulating units must be safety glass, and each light must have a permanent label.

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Two panes of glass separated by a dehydrated airspace and hermetically sealed. Dimensional tolerances shall be as specified in UNI 10593/1. The units shall meet the requirements of UNI 10593/2, UNI 10593/3, UNI 10593/4.

2.2.1 Glazing Requirements Building

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NOTE: For building projects, fill in options in the following paragraph based on design requirements and product availability.

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Provide insulating glass with a [____] mm airspace, a [____] mm thick inner pane of glass meeting the requirements of [____], and a [____] thick outer pane of glass meeting the requirements of [____].

2.2.2 Glazing Requirements Control Tower

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NOTE: For control tower projects use the first set of brackets for projects with a design wind load of less than 225 kilometers per hour, the second set for higher wind loads. Coordinate the term of warranty with paragraph entitled "Warranty".

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Provide insulating glass units with a 13 mm air space and glass conforming to the requirements of EN 572-1 and the following: [Outer pane of heat absorbing float glass in accordance with the paragraph entitled, "Heat Absorbing Glass", tinted green, 6 mm thick and an inner pane of clear float glass in accordance with paragraph entitled, Clear Glass", 6 mm thick] [Provide both panes of clear heavy float glass in accordance with paragraph entitled, "Clear Glass", 10 mm thick.] and the following:

a. Light transmissivity equal to [65] [____] percent.

b. Aluminum or stainless steel frames.

c. Fabricated for use at an elevation of [____] meters above sea level.

d. Free of visible distortion.

e. Permanent label affixed to both exterior surfaces indicating the unit manufacturer.

2.2.2 Available Manufacturers

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NOTE: For Air Force installations, do not modify these requirements without approval of Headquarters, U.S. Air Force. Where design wind speed is more than 225 kilometers 140 miles per hour, delete the first and use the second bracketed sentence. Coordinate term of warranty with paragraph entitled "Warranty."

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Manufacturers producing products meeting the requirements of this specification included but are not limited to the following:

Thermofloat
via G. De Grassi, 8
20123 Milano
Tel: 02/88-061

Hard Glass, S.p.a.
via Olmeo, 7
35010 Villafranca Padovana (PD)
Tel: 049/907-5066

Fax: 049/907-5297

Not all manufacturers product all products specified.

2.2.3 Low Emissivity Glass

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NOTE: Low emissivity coating should be on the air space surface of the inner pane of glass (the number 3 surface) unless consultation with the mechanical designer indicates that it should be placed on the number 2 surface.

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Insulating glass units (IGU) shall have a thin metallic high-transmittance coating applied to the number [2] [3] surface of the unit. The U-value for the IGU shall be no greater than 0.34.

2.3 PLASTIC GLAZING

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NOTE: Refer to paragraph entitled, "Projectile-Resisting Glass", for categories of projectile-resistant glazing. Consult manufacturers for exact thickness and availability.

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2.3.1 Acrylic Sheet

[ISO 7823-1, ISO 7823-2, regular] [heat resistant,] [_____] mm inch thick, [clear] [_____] in color. [Provide [_____].]

2.3.2 Polycarbonate Sheet

ISO 7391-1, ISO 11963, [Clear and smooth both sides] [Translucent, textured both sides] [Gray tint] [Bronze tint] [mar-resistant] [high abrasion resistant], ultraviolet stabilized, [_____] mm inch thick, meeting the requirements of UNI 9186 as burglar resisting. ([Mar-resistant sheet shall have a change in haze of between 5 and 8 percent under silica carbide test, 1600 grams, ISO 9352.])

2.3.3 Extruded Polycarbonate Profiled Sheet

Provide [double] [triple] walled, surface treated for improved UV resistance, offering thermal efficiency and impact strength.

2.3.4 Projectile-Resistant Plastic Sheet

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NOTE: Projectile-resisting glazing material is available in four power ratings to resist scattered shots from (1) medium-power small arms (MSA); (2) high-power small arms (HSA); (3) super-power small arms (SSA); and (4) high-power rifles (HR).

Projectile-resisting acrylic sheet is listed by UL for MSA rating only and is 25.4 mm one inch thick. Projectile-resisting polycarbonate sheet is listed for MSA 25.4 mm one inch and for HSA and SSA ratin 31.8 mm1 1/4 inch. Consult manufacturers for exact thicknesses and availability.

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Cast acrylic sheet or mar-resistant polycarbonate sheet laminated with a special interlayer, and conforming to requirements of UNI 9187 as projectile-resisting, Class [A] [B] [C] [D] [E], [clear] [_____] in color. [Provide [_____].]

2.4 SETTING AND SEALING MATERIALS

Provide as per manufacturer's recommendations, unless specified otherwise herein. Do not use metal sash putty, nonskinning compounds, nonresilient preformed sealers, or impregnated preformed gaskets. Materials exposed to view and unpainted shall be gray or neutral color.

2.4.1 Linseed-Oil Putty

Use for face glazing primed wood sash. Do not use with insulating glass units or laminated glass.

2.4.3 Elastomeric Sealant

ISO 11600, Glazing, 12.57 expandability. Use for channel or stop glazing [wood] [and] [metal] sash. Sealant shall be chemically compatible with setting blocks, edge blocks, and sealing tapes[, with sealants used in manufacture of insulating glass units] [, and with plastic sheet]. Color of sealant shall be [as selected] [gray] [white] [_____].

2.4.4 Preformed Channels

Neoprene, vinyl, or rubber, as recommended by the glass manufacturer for the particular condition. [Channels for bullet-resistant glass shall be synthetic rubber, ISO 3934, not less than 6 mm 1/4 inch thick and sufficiently resilient to accommodate expansion and contraction while maintaining a vaportight seal between glass and frame.] [Channels shall be chemically compatible with plastic sheet.]

2.4.5 Sealing Tapes

Preformed, semisolid, polymeric-based material of proper size and compressibility for the particular condition. Use only where glazing rabbet is designed for tape and tape is recommended by the glass or sealant manufacturer. Provide spacer shims for use with compressible tapes. Tapes shall be chemically compatible with the product being set.

2.4.6 Setting Blocks and Edge Blocks

Lead or neoprene of 70 to 90 Shore "A" durometer hardness, chemically compatible with sealants used, and of sizes recommended by the glass

manufacturer.

2.4.7 Accessories

Provide as required for a complete installation, including glazing points, clips, shims, angles, beads, and spacer strips. Provide noncorroding metal accessories. Provide primer-sealers and cleaners as recommended by the glass and sealant manufacturers.

PART 3 EXECUTION

3.1 PREPARATION

Preparation, unless otherwise specified or approved, shall conform to applicable requirements of UNI 6534 and manufacturer's recommendations. Determine the sizes to provide the required edge clearances by measuring the actual opening to receive the glass. Grind smooth in the shop glass edges that will be exposed in finish work. Leave labels in place until the installation is approved, except remove applied labels on heat-absorbing glass and on insulating glass units as soon as glass is installed. Securely fix movable items or keep in a closed and locked position until glazing compound has thoroughly set.

3.2 GLASS SETTING

Shop glaze or field glaze items to be glazed using glass of the quality and thickness specified or indicated. Glazing, unless otherwise specified or approved, shall conform to applicable requirements of UNI 6534, and manufacturer's recommendations. Aluminum windows, wood doors, and wood windows may be glazed in conformance with one of the glazing methods described in the standards under which they are produced, except that face puttying with no bedding will not be permitted. Handle and install glazing materials in accordance with manufacturer's instructions. Use beads or stops which are furnished with items to be glazed to secure the glass in place.

3.2.1 Sheet Glass

Cut and set with the visible lines or waves horizontal.

3.2.2 Patterned Glass

Set glass with one patterned surface with smooth surface on the weather side. When used for interior partitions, place the patterned surface in same direction in all openings.

3.2.3 Insulating Glass Units

Do not grind, nip, or cut edges or corners of units after the units have left the factory. Springing, forcing, or twisting of units during setting will not be permitted. Handle units so as not to strike frames or other objects. Installation shall conform to applicable requirements of UNI 6534.

3.2.4 Installation of Wire Glass

Install glass for fire doors in accordance with installation requirements of UNI 9723.

3.2.5 Installation of Heat-Absorbing Glass

Glass shall have clean-cut, factory-fabricated edges. Field cutting will not be permitted.

3.2.6 Installation of Laminated Glass

Sashes which are to receive laminated glass shall be weeped to the outside to allow water drainage into the channel.

3.2.7 Plastic Sheet

Conform to manufacturer's recommendations for edge clearance, type of sealant and tape, and method of installation.

3.3 ADDITIONAL REQUIREMENTS FOR GLAZING CONTROL TOWER WINDOWS

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NOTE: For Air Force installations, do not modify these requirements without approval of Headquarters, U.S. Air Force. Where design wind speed is more than 225 kilometers 140 miles per hour, delete the last sentence.

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3.3.1 Materials and Methods of Installation

Comply with the manufacturer's warranty and written instructions, except as indicated. Install units with the heat-absorbing glass to the exterior. Secure glass in place with bolts and spring clips. The minimum clearance between bolts and edge of glass unit shall be 4.75 mm 3/16 inch. The glass shall be edged with 4.75 mm 3/16 inch thick continuous neoprene, vinyl, or other approved material. Trim edging after installation. The channel shapes or strips shall be firmly held against the glass by the spring action of the extruded metal moldings. Resilient setting blocks, spacer strips, clips, bolts, washers, angles, applicable glazing compound, and resilient channels or cemented-on materials shall be as recommended in the written instructions of the glass manufacturer, as approved.

3.3.2 Tolerances and Clearances of Units

Design to prevent the transfer of stress in the setting frames to the glass. Springing, twisting, or forcing of units during setting will not be permitted.

3.4 CLEANING

Clean glass surfaces and remove labels, paint spots, putty, and other defacement as required to prevent staining. Glass shall be clean at the time the work is accepted. [Clean plastic sheet in accordance with

manufacturer's instructions.]

-- End of Section --